

Name \_\_\_\_\_

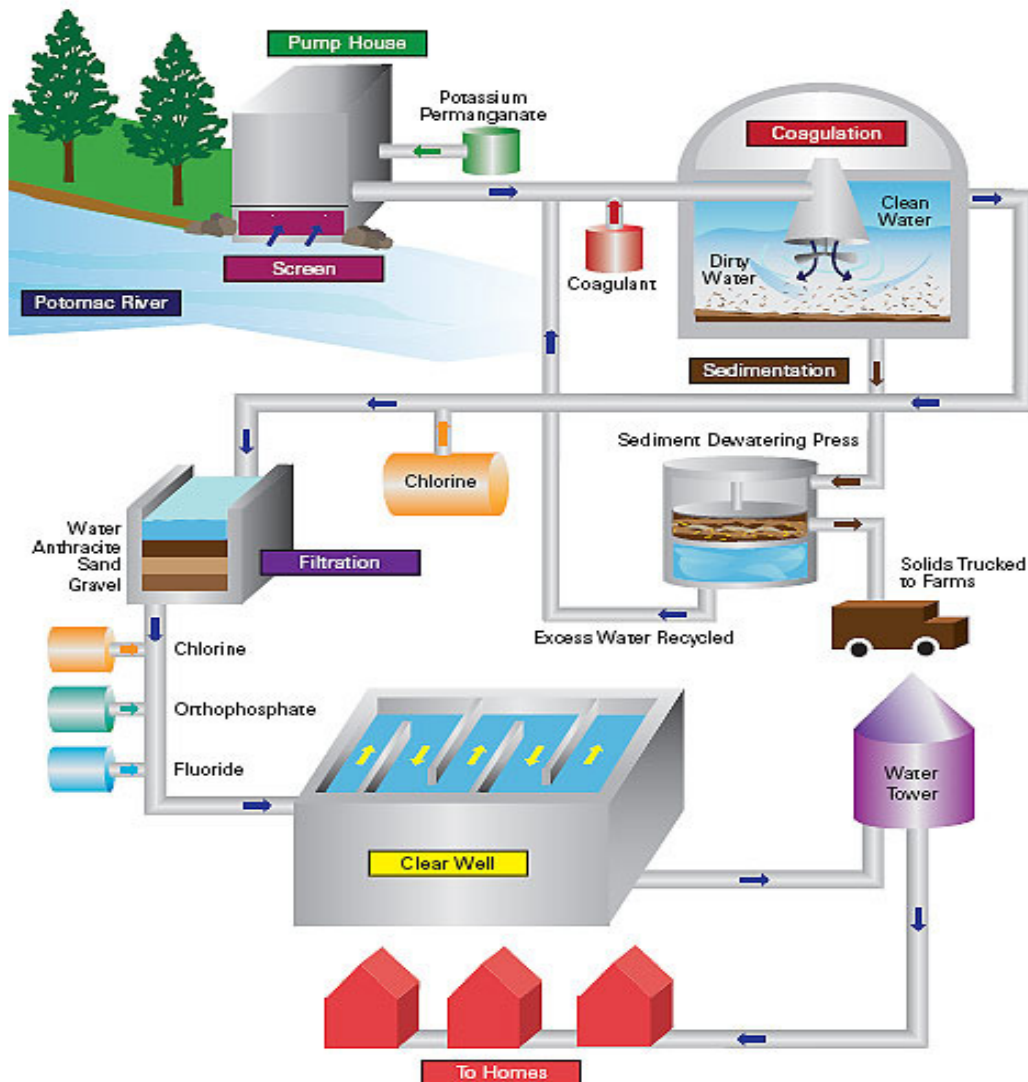
## Water Filtration Lab

20 pts

Background:

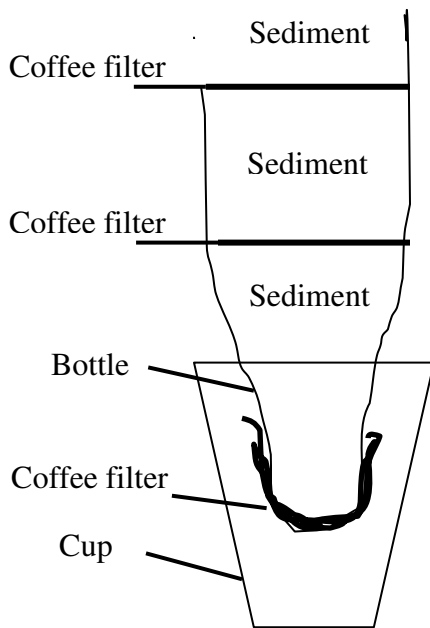
Water in lakes, rivers, and swamps often contains impurities that make it look and smell bad. The water may also contain bacteria and other microbiological organisms that can cause disease. Consequently, water from most surface sources must be “cleaned” before it can be consumed by people. Water treatment plants typically clean water by taking it through the following processes:

1. Aeration
2. Coagulation
3. Sedimentation
4. Filtration
5. Disinfection



## Procedure:

- **Aeration** (adds air to the water and allows gases trapped in the water to escape)
  1. Using one of your tall, skinny cups, get a sample of swamp water from the 2 liter bottle that has been shaken
  2. Pour the swamp water back and forth between the two skinny cups **10 times**
- **Coagulation** (process by which dirt and other suspended solid particles clump together so they can easily be removed from the water)
  1. Bring your swamp water up to my desk to get a tablespoon of alum
  2. Slowly stir the water and alum for about **5 minutes**
- **Sedimentation** (process that occurs when gravity pulls the solid particles to the bottom of the cylinder)
  1. Record the appearance and smell of the water to start under Part A
  2. Allow the water to stand undisturbed in the cup for about **10 minutes**
- **Filtration** (removes most of the impurities remaining in the water)
  1. While waiting for sedimentation to occur, construct your filter



- a. Attach a coffee filter to the outside of the neck of the bottle with a rubber band
- b. Place bottle upside down in large, wide-mouthed cup
- c. Pour a small amount of sediment into the bottle
- d. Insert another coffee filter
- e. Pour a small amount of sediment on top of the 2<sup>nd</sup> coffee filter
- f. Repeat for remaining sediments. NOTE: You need to have **at least 3** sediment layers and 3 coffee filters. If your group chooses to do so, you may use the sediment provided to construct more than 3 layers, but all the sediment needs to be used, and a coffee filter needs to be between each layer of sediment
- g. Clean the filter by carefully pouring a beaker of clean water onto your water filter (try not to disturb the top layer as you pour the water)
- h. Pour the water that comes out into the waste bucket

2. When sedimentation is complete, carefully pour the top two-thirds of your swamp water into the filter
    - **Do NOT disturb the sediment in the bottom of the cup!**
  3. Compare the untreated and treated water
    - Note the appearance and the smell
- **Disinfection**
    - The final step at the treatment plants is to add disinfectants (like chlorine) to the water to purify it and kill any organisms that may be harmful, such as bacteria
    - **Our filtered water is unfit to drink because we did not add disinfectants!**

Diagram:

Your group needs to decide how you will construct your water filter. The sediments used in your filter will include gravel, coarse sand, and fine sand, but you get to determine the number and order of your layers. In the space below **draw a detailed diagram** of you water filter. Make sure to **LABEL** each part, including the type of sediment, coffee filter layers, the bottle, and the collection cup.

Name \_\_\_\_\_

## Water Filtration Lab Analysis

A. Record the smell and appearance of the swampy water to start.

B. Record your observations of the water after it has been poured through the filter. Note the smell and appearance.

C. Write at least 3 sentences describing what you learned from this lab. Be specific and use detail. **Include whether you think treatment has changed the appearance and smell of the water.**

D. If your group could construct your filter a second time, what parts would you keep the same and what you change? Support your reasoning with your observations.

***DON'T FORGET TO DEFINE THE TERMS AND ANSWER THE QUESTIONS ON THE BACK OF THIS SHEET!***

E. Define the following:

- Aeration
- Coagulation
- Sedimentation
- Filtration

F. Answer the following questions.

- How did you aerate the water?
- What did you add to the water to aid in coagulation?
- Where does sedimentation pull all of the solid particles?
- Name a disinfectant added to water at a treatment plant.
- Why are disinfectants added to the water at the treatment plant?
- Why is our filtered water unfit to drink?